Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 28. January, 1926. No. 325.

NOTES ON A COLLECTION OF FRESH WATER MYXOPHYCEAE FROM AMOY, CHINA.[1]

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During a recent visit to the Farlow Library and Herbarium, the privileges of which were extended to me for the purpose of working on a large collection of fresh water Myxophyceae collected in Porto Rico by the late Dr. Wille, I took the opportunity to examine also a small collection of fresh water forms which had been sent to the herbarium by Professor H. H. Chung, who collected them in the vicinity of Amoy, China. The material proved to be in excellent condition, having been preserved in formalin and contained a number of forms of considerable interest, some of which have not been previously described, and I am presenting herewith the results of my examination of the different species as I interpret them, with descriptions of such as are new to science.

Merismopedia glauca (Ehrb.) Naeg. A 95.

Chamaesiphon sp. A 83. Material young.

Pleurocapsa fuliginosa Hauck. A 74b. The material of this species is all in the vegetative condition. It answers to Hauck's description and figures in so far as they apply to the vegetative stage.

Spirulina major Kuetz. A 73b. Sparse.

Oscillatoria princeps Vauch. A 94.

O. chalybea (Mertens) Gom. A 73.

O. amphibia Ag. A 73a.

O. tenuis Ag. var. tergestina (Kuetz.) Rab. A 73c.

O. sancta (Kuetz.) Gom. var. caldariorum Lagerh. A 71b.

O. laete-virens (Crouan) Gom. A 107a.

O. irrigua (Kuetz.) Gom. A 67.

[1] Contributions from the Cryptogamic Laboratories of Harvard University, xcii.

O. SUBTILISSIMA Kuetz. var. LITORALIS (Hansg.) DeToni. A 102. PHORMIDIUM CORIUM (Ag.) Gom. A 70.

P. quadripunctulata (Brühl and Biswas.) Gardner, comb. nov. *Oscillatoria quadripunctulata* Brühl and Biswas.[1] A 49, A 86a. The material of this species is attached to the gelatinous tegument of *Rivularia* (Gloeotrichia) *indica* (Schmidle) DeToni, and it has a thin, but very distinct, sheath. The trichomes correspond exactly to the description and figures of Brühl and Biswas (loc. cit.). Although I have not examined any of their material of that species it seems necessary to make the new combination.

P. CABENNENSE Gom. A 88a.

P. ORIENTALE G. S. West, var. **breviarticulata** Gardner, var. nov. Trichomes very slightly constricted at the dissepiments; cells one-third to two-thirds as long as broad, otherwise as the species. Growing on the bank of a ditch. Amoy Island, Fukien Province, China. *H. H. Chung*, A 74, type, in Farlow Herbarium.

P. CALIDUM (Kunth) Gom. A 74a.

P. FOVEOLARUM (Mont.) Gom.

P. bigranulatum Gardner, sp. nov. Filaments scattered on or within the soft tegument of the host, long and relatively straight, 0.8–1.0 μ in diameter; trichome 0.7–0.9 μ in diameter, not constricted at the dissepiments, neither uncinate nor capitate; cells 9–13 μ long, cross walls inconspicuous, with two conspicuous granules at each cross wall, eruginous; sheath imperceptible except where there is a break in the trichome or occasionally at the ends of the trichome. Growing on or within the gelatinous tegument of *Rivularia* (Gloeotrichia) *indica*, attached to submerged aquatic plants. Amoy Island, Fukien Province, China. *H. H. Chung*, A 90a, type, in Farlow Herbarium.

Phormidium bigranulatum, as diagnosed above, is related to *P. laminosum* (Ag.) Gom. and to *P. angustissimum* W. and G. S. West. It differs from the former in being smaller, in having blunt apices, and in having but two, instead of four, granules at the partitions. The latter species is smaller and has no granules.

LYNGBYA EPIPHYTICA Hieron. A 71a.

ANABAENA MACROSPORA Klebh. var. **distorta** Gardner, var. nov. Filaments densely intertwined and much contorted, forming thick abundant, floating masses; cells densely and coarsely granular, the

[1] Brühl, P. and Biswas, K. Commentationes algologicae. I. The algae of Bengal filter-beds. Jour. Dept. Sci. [Univ. Calcutta] Botany. **4:** 5. *pl. 1, fig. 6.* 1922.

granules being irregular in form and dark colored; resting spores more or less asymmetrical, 9–10 μ in diameter, 14–15 μ long, filled with large refringent granules; heterocysts spherical, 7.0–7.4 μ in diameter.

Floating in great abundance along the margin of a pond. Amoy Island, Fukien Province, China. *H. H. Chung* A 93, type in Farlow Herbarium.

The variety differs from the species in having slightly smaller spores and cells, with the spores densely granular and more curved, in having slightly larger heterocysts and in having much distorted filaments.

ANABAENA sp. Sterile. A 53, A 100, A 103 and A 107.

NOSTOC sp. Sterile and young. A 89.

CYLINDROSPERMUM sp. Sterile. A 69.

CALOTHRIX PARIETINA (Naegl.) Thur. A 88.

C. linearis Gardner, sp. nov. Filaments free among other algae, 500–800 μ (occasionally up to 1500 μ) long, slightly enlarged at the base, the remainder linear, sparsely branched; branches usually single and erect, rarely geminate and scytonematoid; trichomes almost cylindrical throughout the entire length, 3–5 cells at the base slightly wider than the remaining cells, these cells later changing into resting spores, 6 μ in diameter at the base, tapering from 6.3–4.0 μ just above the base to 2.5 μ at the apex, terminating in a hair (?) bright eruginous, with relatively large granules in the cell; cells varying from one-third to two-thirds as long as the diameter below to 2.5 to 3 times as long above; heterocysts hemispherical, basal and intercalary (?); sheath thin, hyaline, homogeneous, not ocreate above.

There is no data accompanying this species but presumably it was collected in the vicinity of the University of Amoy, Fukien Province, China. *H. H. Chung*, A 54, type, in Farlow Herbarium.

This species of Calothrix may be distinguished by the relatively long filaments which taper but very slightly and extremely gradually from a short distance above the base to the apex, only a few cells above the base of the trichome being larger than the others. I was unable to find any trichomes with hairs, but since the delicate sheath extends beyond the ends of the trichomes it is presumed that the hairs have disappeared. The branching is sparse and it is not possible to state whether or not the break in the trichome and branching at the point which follows, takes place before or after a heterocyst is formed on the base of the part above. Geminate branching may take place without any heterocysts being formed. The material is apparently young and the few resting spores observed seemed not mature. These were several times longer than the diameter.

RIVULARIA (Gloeotrichia) INDICA (Schmidle) DeToni. A 86, A 90. The material of the two above numbers seems scarcely mature. The resting spores in many cases have not started to develop, but some are 70 × 12–15 μ, with hyaline walls. The spores seem to be formed by the fusion of 2–4 basal cells. The trichomes extend outward and terminate in a long hyaline hair. After the hair dies back, the outer end of the trichome is considerably larger than the middle portion, even down to near the base. The colonies seem larger than those of *R. indica* but the material is all in formalin and the teguments have swollen and fused. It may be that it will be necessary to create a new species for the material when more is known about its life history.

TOLYPOTHRIX **Chungii** Gardner, sp. nov. Filaments 20–24 μ in diameter, forming together with other filamentous algae a free floating, flocculent stratum, sparsely branched; trichomes 18–20 μ in diameter, bright eruginous, not constricted at the dissepiments; cells one-fourth to one-half as long as the diameter, more or less finely granular; heterocysts spherical or in part compressed spherical numerous, single; trichomes mostly conical at the point of attachment to the heterocysts; sheath relatively thin, homogeneous and hyaline in the juvenile state, becoming slightly honey colored or brownish at maturity.

Growing in company with other algae in a pool near the University of Amoy, Fukien Providence, China. *H. H. Chung*, A 71, type, in Farlow Herbarium.

T. tenella Gardner, sp. nov. Filaments aggregated into small tufts or fascicles, 3–4 mm. long, 12–15 μ in diameter; trichomes 10–12 μ in diameter, deeply constricted at the dissepiments; cells one-fourth to one-half as long as broad, eruginous, finely granular, cross walls very thin; heterocysts single, rarely 2–3 catenate, numerous, spherical; sheath hyaline, homogeneous, membranaceous in the juvenile stage becoming thicker and subgelatinous when older.

Growing on stones and small roots in sheltered pools of a mountain stream. Amoy Island, Fukien Province, China. *H. H. Chung*, A 75, type, in Farlow Herbarium.

Tolypothrix tenella is probably most closely related to *T. lanata* (Desv.) Wartmann, from which it differs in having shorter filaments with greater diameter, in having shorter cells which are deeply constricted at the dissepiments, and in part decidedly dolioform in the apical portion of the trichome.

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